



Spring 2009 Seminar Series

Department of Biomedical Engineering

Wednesday, February 25th @ 3PM in Steinman T-402



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Micro- and Nano-scale Engineering of the Cellular Environment

Cells are able to recognize and respond to the complex juxtaposition of multiple biological cues in the extracellular space. This occurs over multiple scales, ranging from long-distance pathfinding by neurons and cell-by-cell coordination in the stem cell niche. At the sub-cellular scale, an emerging picture of T cell – antigen presenting cell communication is that the organization of signaling complexes in this interface directs cell function. This seminar focuses on our recent advances in the adaptation of contemporary micro- and nano-scale fabrication methods for use with biomolecules, providing a powerful approach to capturing and manipulating this complexity in vitro. We demonstrate this approach in a select set of cellular systems. For example, T lymphocytes are able to recognize micrometer-scale changes in TCR and CD28 signaling, modulating cellular activation in response to specific patterns. The molecular underpinning of this ability as well as functional impacts on cell differentiation will be discussed. Complementary results in the context of neural, epithelial, and lipid membrane systems will also be presented.